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标题: All-optical dynamic frequency conversion in silicon photonic crystal cavities
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摘要: We propose and for the first time realize a concept for dynamic frequency conversion in silicon photonic crystal cavities using an in-plane pumping configuration. The required fast index change of silicon is performed by generating free carriers through two-photon absorption of a pump pulse. We perform a theoretical analysis of the time dependence of the energy in a cavity coupled to two identical ports that is excited by a Gaussian signal. We find that the maximum energy that can be stored in the cavity is always lower than the energy of the excitation pulse and that it depends on the ratio of the cavity lifetime to signal duration. At the optimum of this ratio, a maximum of 40% of the input pulse energy can be stored in the cavity and thus submitted to the dynamic frequency conversion process. We show experimentally a dynamic frequency shift of 7.5.10(-2) THz.
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